

PLANARIZING MACHINES AND METHODS FOR MECHANICAL AND/OR  
CHEMICAL-MECHANICAL PLANARIZATION OF MICROELECTRONIC-DEVICE  
SUBSTRATE ASSEMBLIES

ABSTRACT

Planarizing machines and methods for selectively using abrasive slurries on fixed-abrasive planarizing pads in mechanical and/or chemical-mechanical planarization of microelectronic substrate assemblies. In one embodiment of a method in accordance with the invention, a microelectronic substrate is planarized by positioning a fixed-abrasive planarizing pad on a table of a planarizing machine, covering at least a portion of a planarizing surface on the pad with a first abrasive planarizing solution during a first stage of a planarizing cycle, and then adjusting a concentration of the abrasive particles on the planarizing surface at a second stage of the planarizing cycle after the first stage. The concentration of the second abrasive particles can be adjusted during the second stage of the planarizing cycle by coating the planarizing surface with a non-abrasive second planarizing solution without abrasive particles during the second stage. The second planarizing solution can be dispensed onto the planarizing surface after terminating a flow of the first planarizing solution at the end of the first stage of the planarizing cycle, or the flow of the first planarizing solution can be continued after the first stage of the planarizing cycle. Several embodiments of these methods accordingly use only the abrasive first planarizing solution during a pre-wetting or initial phase of the first stage of the planarizing cycle, and then either only the second planarizing solution or a combination of the first and second planarizing solutions during a second stage of the planarizing cycle. Additionally, abrasive planarizing solution can be dispensed at the end of the polish cycle (activated by time or endpoint) in order to improve polish characteristics of fixed abrasives polish on planarized wafers.